WSTIAC Success Story

Load Based Statistical Model for Naval Air Engineering Station (NAES) Legacy Aircraft Launch and Recovery (ALRE) Gear

[HTTP://WSTIAC.ALIONSCIENCE.COM]

Customer:	Naval Air Engineering Station (NAES), Lakehurst, NJ
Challenge:	Naval Air Systems Command (NAVAIR) used legacy arresting gear systems that have been kept in fleet well beyond the original planned service life to launch and recover aircraft. The number of arrestments before preventative maintenance (PM) on the legacy systems was determined using a rough weighting factor to account for newer, heavier aircraft. The precise relationship between the weight/speed of the aircraft recovered and the stress and associated wear rates on the gear was not previously known. This presented a concern, as newer larger aircraft like the F-35 Joint Strike Fighter and the F/A-18 Super Hornet were being introduced to the fleet.
Approach:	To ensure the safety of our Warfighters and allow the Navy to extend the useful life of the arresting gear, WSTIAC, in partnership with NAVAIR Reliability and Maintainability (R&M) Engineering 4.1.10.1 and Rutgers University, developed a load based model. This model accounts for the effect of weights and speeds of aircraft on the legacy recovery gear system. To develop the model, the team adopted a two-pronged approach. First, the team used stress strength analysis to predict future loads on equipment. They also applied Weibull statistical analysis techniques to maintenance/logistics data and daily arrestment logs from the U.S. Navy Supercarriers. This technical approach is unique in that it is the first time that anyone has combined stress/strength techniques with mined maintenance/logistics data to develop a model to better predict the number of cycles before maintenance

	is required.
Value:	NAES will use the legacy system load-based model to implement condition based maintenance philosophies. The load based model in conjunction with a new computerized maintenance data records system will ensure that condition based maintenance is possible. This will result in lower life cycle costs (five to ten percent have been reported in similar cases) and improved readiness/availability (four to six percent was achieved on Army helicopters in Operation Enduring Freedom (OEF) of the ALRE systems. This will save the Navy resources (e.g., other programs have experienced a five to ten percent decrease in life cycle costs and/or 20 percent reduction in maintenance man-hours) while at the same time ensure the continued safety of our pilots and personnel.